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**IMPROVEMENTS PROVIDED FOR PROTECTIVE GLOVES, PARTICULARLY FOR  
ELECTRICIANS, AND FOR THEIR PROCESSES OF MANUFACTURING**

Joint-stock company known as: Hutchinson-Mapa

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IMPROVEMENTS PROVIDED FOR PROTECTIVE GLOVES, PARTICULARLY FOR  
ELECTRICIANS, AND FOR THEIR PROCESSES OF MANUFACTURING

[Perfectionnements apportés aux gants de protection, notamment pour electriciens et à leurs  
procédés de fabrication]

Applicant: Joint-stock company known as:  
Hutchinson-Mapa, residing in France

The present invention relates to improvements provided for protective gloves,  
particularly for electricians, and for their processes of manufacturing.

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The protective gloves for electricians offered up to now are made of elastomer such as rubber and are produced by dipping of a form in a rubber solution or a latex emulsion which contains additives which give the final product dielectric properties. However, although such rubber or latex gloves provide effective protection for their users when they are employed under voltage, they can nevertheless be altered in contact with grease and solvents.

Furthermore, the insulating gloves made of rubber are not very comfortable to wear because they do not always provide good thermal insulation: they do not slide well and are consequently difficult to put on and take off; moreover, they cause extensive sweating of the hands. In order to palliate these disadvantages, it has been proposed according to prior art to provide insulating gloves for electricians with an interior lining made of textile material which provides thermal insulation for the user and facilitates putting on and taking off of the gloves.

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\* [Numbers in the right margin indicate pagination of the foreign text.]

This solution however has the great disadvantage of considerably reducing the dielectric constant of the dielectric elastomer material constituting the insulating glove because of the presence of small electricity conducting hairs on the textile material, so that the insulation properties of such gloves are difficult to obtain in a constant and reproducible manner.

Consequently, electricians are frequently led to protecting their hands by wearing several superposed gloves, namely: a glove made of textile in contact with the skin, which provides the desired thermal insulation, a glove made of dielectric elastomer worn over the textile glove, which provides the desired electrical insulation, and a leather glove worn over the latter and which protects it from impacts and alterations by mechanical agents; however, wearing such a superposition of gloves is awkward and moreover considerably alters the tactile capability of the user because of the thickness and stiffness of the triple combination of protective and insulating gloves.

The present invention is consequently dedicated to the aim of providing a protective glove for electricians which meets practical needs better than the previously proposed insulating gloves according to prior art, particularly by the fact that it has extensive dielectric properties, while providing the user with the necessary comfort and thermal insulation, by the fact that it has a good resistance to chemical aggression agents, such as greasy materials, solvents, ozone, etc... and to ultraviolet radiation, and by the fact that it has anti-slip properties. /2

2\ The present invention relates to a protective glove for electricians, which is given extensive dielectric properties, which is capable of providing protection under test voltages of at least 5000 volts, and which has extensive resistance to chemical aggression agents and to ultraviolet radiation, glove which is characterized by the fact that it includes, in combination: - at least one exterior layer made of synthetic elastomer, which has extensive resistance to chemical aggression agents and to ultraviolet radiation; - at least one middle layer made of natural or synthetic elastomer which has extensive dielectric properties, which is capable of providing electrical insulation at test voltages of at least 5000 volts; - and an internal layer of natural or synthetic textile fibers applied by flocking on the surface of the median layer – or of one median layer – turned towards the interior of the glove, internal layer which has excellent comfort and thermal insulation properties.

According to a preferred embodiment of the insulating glove for electricians according to the present invention, the exterior layer, or outer-most layer, of the glove, made of synthetic elastomer, is provided, on the surface of the glove which corresponds to the anterior surface of the hand, with anti-slip surfaces manufactured integrally and consisting, for example, of a number of juxtaposed ribs or of a number of raised projections in the form of stubs, which cover appropriate parts of the anterior surface of the glove or all of said surface.

According to the invention, the exterior layer made of synthetic elastomer is produced out of a synthetic elastomer which can be, for example, but in a non-limiting manner, polychloroprene, polyurethane, nitrile rubber, etc... >

In a known manner, the exterior layer or layers made of synthetic elastomer having extensive properties of resistance to chemical agents and to ultraviolet radiation, is (are) given a different color from that of the middle layer or layers having extensive dielectric properties, in order to be able to see the wear and tear of the glove according to the invention. /3

The present invention also relates to a process for manufacturing of the insulating glove for electricians as defined above, process which consists: - of first of all producing, on a form or mold with the configuration of a hand, at least one exterior layer of a synthetic elastomer with extensive resistance to chemical aggression agents, to ozone and to ultraviolet radiation, in particular, by dipping of said mold or form in a solution or in an emulsion of a synthetic elastomer which contains additives suitable for giving it the aforementioned properties of resistance; - then of applying on the exterior layer or on an exterior layer, at least one middle layer of a natural or synthetic elastomer having extensive dielectric properties, capable of providing electrical insulation of the user of the finished glove, for test voltages of at least 5000 volts, by dipping of the mold or form covered with the above-mentioned exterior layer or layers, in a solution or in an emulsion of natural or synthetic elastomer containing additives suitable for giving it said dielectric properties; - then of applying, on said middle layer or on a middle layer, a layer of natural or synthetic textile fibers by flocking.

According to an advantageous embodiment of the process to which the present invention relates, the mold or form for manufacturing of the glove has, on its surfaces which correspond to the anterior surface of the hand, grooved zones or zones having a number of small hemispherical craters, representing, in the form of hollows, the configuration of the anti-slip surfaces of the glove, with it possible for said zones to cover or not cover all of the anterior surface of the glove.

According to the invention, the synthetic elastomer having extensive properties of chemical and mechanical resistance and the natural or synthetic elastomer with extensive dielectric properties contain, in a manner known in itself, pigments of different colors. /4

Besides the preceding arrangements, the invention also includes other arrangements which will emerge from the following description.

The invention more particularly relates to protective gloves for electricians according to the preceding arrangements, as well as to their manufacturing processes and the means for implementation of these processes and production of these gloves, as well as to installations for manufacturing of the gloves according to the present invention.

The invention will be better understood with the help of the rest of the description which follows, which refers to the appended drawing in which:

- Figure 1 represents the glove according to the present invention, seen on its anterior surface, and

- Figure 2 is a view in section according to II-II of the glove represented in Figure 1.

It must be understood however that this drawing and the corresponding descriptive parts are given only for the sake of illustrating the object of the invention, of which they do not in any way constitute a limitation.

The glove represented as an example in the drawing and designated generally by the reference 1 has, on its anterior surface 2, anti-slip zones 3 and 4 which cover, for example, as represented, respectively the part of the palm located below the thumb, and the anterior surfaces of the fingers; it will be easily understood that the anti-slip zones can be limited to zone 3, or that they can cover all of the anterior surface of the glove. These anti-slip zones are, in the execution example represented, made up of integrally manufactured ribs obtained by giving the manufacturing mold the corresponding structure in the form of hollows; it will however be easily understood that these ribs can be replaced by any other suitable raised projections, such as hemispherical stubs, for example, also manufactured integrally, by giving the manufacturing mold an appropriate structure in the form of hollows.

As shown in Figure 2, the glove has internal layer 5 made of natural or synthetic textile fibers, deposited by flocking on the surface not connected to the exterior layer, of median layer 6 made of elastomer or a mixture of elastomers having extensive dielectric properties, such as natural rubber, for example. Exterior layer 7 of the glove is produced out of a synthetic elastomer or mixture of elastomers having an extensive resistance to chemical aggression agents such as greasy materials, solvents, to ozone, to ultraviolet radiation, etc..., with it possible for such a synthetic elastomer to advantageously but not exclusively be a polychloroprene, a polyurethane, a polyacrylonitrile, nitrile rubber, etc..., the elastomers or mixtures of elastomers respectively constituting middle layer 6 and exterior layer 7 advantageously containing, in a known manner, colored pigments of different colors in order to be able to see their wear and tear.

Exterior layer 7 and middle layer 6 can each be formed by the superposition of a number of films respectively of the material constituting layer 7 and of the material constituting layer 6.

Layers 7 and 6 are obtained respectively by successive dipping operations, according to the usual techniques, of a mold or of a form of appropriate configuration and possibly of arrangement in solutions or emulsions of the elastomers or mixtures of elastomers defined above and respectively having good properties of resistance to chemical aggression agents and other agents, and good dielectric properties.

The gloves according to the present invention were subjected to a test according to French standard NF C 18415 in order to verify their insulating properties with regard to voltages

of at least 5000 volts and more, that is to say to the tests applicable to the so-called "suede cloth" gloves of type II.

This test consists of filling each glove which is checked with aluminum shot of which the diameter of the grains is between 1 and 1.4 mm, up to 5 cm from the edge of the wrist band of the glove, and then of immersing the glove filled in this way, up to the above-mentioned height, in water at a temperature of approximately 20°C, whose conductivity has been slightly increased by addition of a small amount of sodium chloride.

Two electrodes immersed respectively in the shot of the glove and in the water of the tank connect the two poles of the alternating current source; a milliammeter is mounted for measurement of leakage currents. An alternating current with a frequency of 50 Hz is applied. The rise in voltage takes place gradually over a few seconds up to the voltage of 5000 volts corresponding to type II, which is maintained strictly constant for one minute.

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The value of leakage current which is measured during the test was less than 5 milliamps for all the gloves tested, and no puncture was observed on the tested gloves following the test.

The test which was performed showed that the gloves according to the present invention correspond to the characteristics required for being classified in the category of protective gloves of type II at least.

It results from the preceding description that, regardless of the modes of implementation, execution and application which are adopted, protective gloves, in particular for electricians, and processes for manufacturing them are obtained which, in comparison with the previously known protective gloves for the same purpose, offer extensive advantages, certain ones of which were mentioned in the preceding and other advantages of which will emerge from use of said gloves.

As emerges from the preceding, the invention is in no way limited to those of its modes of implementation, execution and application which have just been described more explicitly; it rather includes all variants of them which may occur to the technician in this field, without diverging from the scope or the intent of the present invention.

## Claims

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1. A protective glove for electricians, which is given extensive dielectric properties, which is capable of providing protection under test voltages of at least 5000 volts, and which has extensive resistance to chemical aggression agents and to ultraviolet radiation, glove which is characterized by the fact that it includes, in combination: - at least one exterior layer made of synthetic elastomer, or mixture of synthetic elastomers, which has extensive resistance to chemical aggression agents and to ultraviolet radiation; - at least one middle layer made of natural or synthetic elastomer, or a mixture of elastomers, which has extensive dielectric properties, which is capable of providing electrical insulation at test voltages of at least 5000

volts; - and an internal layer of natural or synthetic textile fibers applied by flocking on the surface of the median layer – or of one median layer – turned towards the interior of the glove, internal layer which has excellent comfort and thermal insulation properties.

2. A protective glove for electricians according to Claim 1, characterized by the fact that the exterior layer, or the outer-most layer, of the glove, made of synthetic elastomer, or of a mixture of elastomers, is provided, on the surface of the glove which corresponds to the anterior surface of the hand, with anti-slip surfaces manufactured integrally.

3. A process for manufacturing of a protective glove for electricians according to either of Claims 1 and 2, characterized by the fact that it consists: - of first of all producing, on a form or mold with essentially the configuration of a hand, at least one exterior layer of a synthetic elastomer, or of a mixture of elastomers, with extensive resistance to chemical aggression agents, to ozone and to ultraviolet radiation, in particular, by dipping of said mold or form in a solution or in an emulsion of a synthetic elastomer, or of an elastomer mixture, which contains additives suitable for giving it the aforementioned properties of resistance; - then of applying on the exterior layer or on an exterior layer, at least one middle layer of a natural or synthetic elastomer, or of a mixture of elastomers, having extensive dielectric properties, capable of providing electrical insulation of the user of the finished glove, for test voltages of at least 5000 volts, by dipping of the mold or form covered with the above-mentioned exterior layer or layers, in a solution or in an emulsion of natural or synthetic elastomer, or of a mixture of elastomers, which contains additives suitable for giving it said dielectric properties; - then of applying, on said middle layer or on a middle layer, a layer of natural or synthetic textile fibers by flocking.

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4. A process according to Claim 3, characterized by the fact that the mold or form for manufacturing of the glove has, on its surfaces which correspond to the anterior surface of the hand, zones representing, in the form of hollows, the configuration of the anti-slip surfaces of the glove, with it possible for said zones to cover or not cover all of the anterior surface of the glove.

5. A process according to either of Claims 3 and 4, characterized by the fact that the synthetic elastomer, or the mixture of elastomers, having extensive properties of chemical and mechanical resistance, and the natural or synthetic elastomer, or the mixture of elastomers, with extensive dielectric properties, contain, in a manner known in itself, pigments of different colors.

Fig. 2

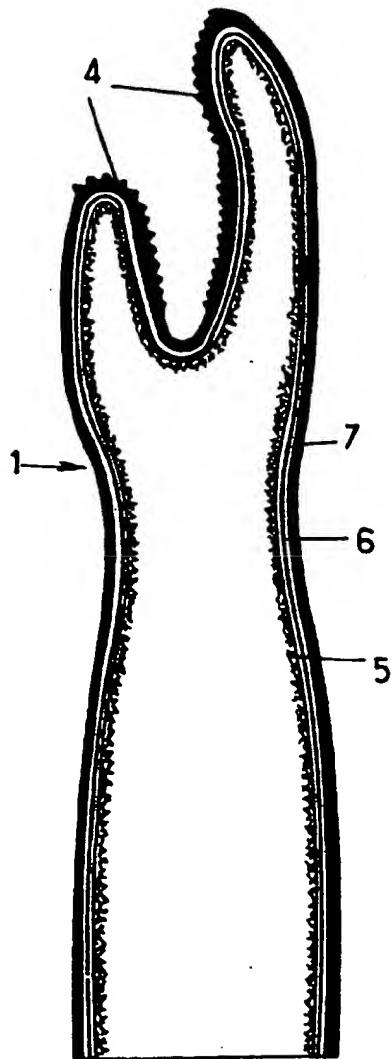


Fig. 1

